13.

Mortality of Albino Embryos and Aberrant Mendelian Ratios in Certain Broods of *Xiphophorus hellerii*.[1]

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(Text-figure 1).

In a previous publication,[2] the author has shown that when the albino swordtail is mated with the golden variety, their offspring resemble neither parent but revert to the ancestral gray coloration of the wild species.

The author showed further that when the gray offspring of the above mating reached maturity and were mated together, brother to sister, the second generation population consisted of three color classes: 202 were "wild" gray, 65 were golden and 67 were albino. These frequencies approached the theoretical 9:3:4 ratio and were interpreted on the basis of the recombination of two independent autosomal factors: *St I* for "wild" gray, *st I* for golden and *St i* and *st i* for albino.

To get the above data the results of four matings were pooled, as Table I will show.

Table I.

Second Generation Offspring of Gray (*Ststt Ii*) Swordtails.

Female No.	Gray	Golden	Albino
70–4	37	12	8
70–5	38	13	6
70–6	50	15	20
70–7	77	25	33
Totals observed	202	65	67
expected	188	63	83

It was noted that there was a deficiency of albinos in the above totals, particularly in broods from females 70–4 and 70–5, yet the two independent factor hypothesis seemed most appropriate in explaining the results. This was confirmed when the Chi-Square test for significance was applied to the pooled data; the value of Chi-Square was found to be 4.18. However the value of Chi-Square for the first two broods alone was 9.84 and indicates the deviations found here cannot be attributed to chance.

Broods were obtained from three additional females after mating with their gray brothers. The three females, 70–8, 70–9 and 70–10, yielded ratios so obviously aberrant that counts of their young were not included in the original presentation because it was thought, at the time, that a contaminating factor was involved in this portion of the experiment. Further study was undertaken to account for these unusual results.

Reports from the laboratories of other workers and from our results as indicated in Table I pointed to a deficiency of albinos in genetic tests. This was attributed to the constitutional weakness of the albino individuals. It was noted, for instance, that if the fishes of a brood are counted soon after birth and again after two months, the death rate of albinos is greater than that of the other color varieties.

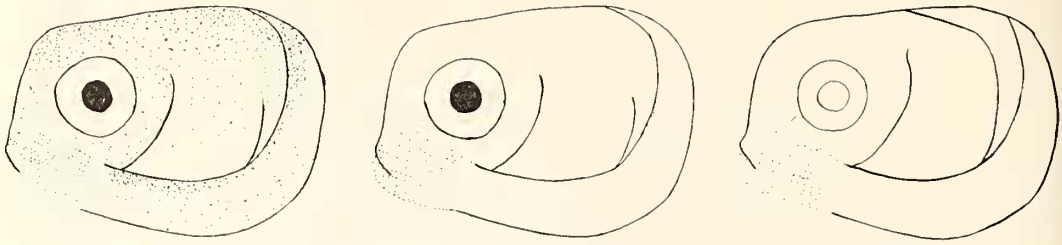
From this evidence it was suspected that the weakness of the albinos may be manifest early, perhaps in their embryonic stages of development. The three additional females, 70–8, 70–9 and 70–10, that produced hardly any albinos in their first broods (see Table II), were killed three weeks after giving birth to their last brood. The females were dissected, their embryos were removed and counts were made of them. In each case an appropriate proportion of albinos was found among the gray and golden embryos. This may be seen in Table II.

Discussion and Conclusions.

It is obvious that the numbers of albinos are decidedly deficient among the young fishes from females 70–8, 70–9 and 70–10; the extremely high value of Chi-Square, 42.46, indicates that the results obtained are not due to chance variation alone. On the other hand, the numbers of albinos

[1] I wish to express my thanks to the Department of Birds of the American Museum of Natural History for the use of their laboratory in the Whitney Wing of the Museum.

[2] Back to their Ancestors, *Journal of Heredity*, 32: 385-390, 1941.



9 "Wild" Gray 3 Golden 4 Albino

Text-fig. 1. Embryos from gray females mated to gray males.

TABLE II.

Offspring of Gray (*Stst Ii*) Swordtails.

Female No.	Gray	Golden	Albino	
70–8	38	11	2	Young
	35	10	13	Embryos
70–9	45	10	1	Young
	40	9	12	Embryos
70–10	58	18	1	Young
	40	12	17	Embryos
Totals:				
Observed	141	39	4	Young
Expected	103.5	34.5	46	
Observed	115	31	42	Embryos
Expected	106	35	47	

found among the embryos of the same females are in close harmony with expectancy. The slight deviations found may be attributed to chance, for the Chi-Square value is low, 1.75.

In light of all the data, the gray females tested may be divided into three groups according to their ability to produce viable albino swordtails. Females 70–8, 70–9 and 70–10 fail in this respect almost completely; females 70–4 and 70–5 fail to produce an adequate number according to expectancy; females 70–6 and 70–7 have the ability to produce viable albino young in normal numbers.

Thus the deficiency of albinos in certain broods must be attributed not only to the low viability of the albinos themselves but also to some failure in the ability of the albinos' mothers to carry their complete broods through to birth.